Contribution to the Knowledge of Phasmida III. Diapause in the eggs of *Extatosoma tiaratum* (MacLeay)

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Introduction

E. tiaratum is an Australian stick insect which is now a commonly bred species in Europe.

From Australian stock Korboot (1961) discussed the duration of the eggs. She found two types, one which hatched after 8 months and another which hatched after 19 months. She suggested that the 19 months' eggs were unfertilised. Later Hadlington (1967) showed that parthenogenetic development of the eggs occured in the species.

I used two females, one fertilised and one unfertilised. They were reared from eggs bought from a British dealer. They were mainly fed on oak, spray daily with lukewarm water and kept at 18-24°C. The eggs were kept in air-tight plastic boxes.

In this paper I will give data for the duration of the eggs of the European stock, and discuss the difference between the duration of the eggs of the Australian and European stock.

Result

The following data were obtained for unfertilised eggs, N = 27:

minium duration: 181 days.
maximum duration: 302 days.
mean duration with standard error, x ± S.E.: 239 ± 5 days.

The following data were obtained for fertilised eggs, N = 98:

minimum duration: 135 days.
maximum duration: 222 days.
mean duration with standard error, x ± S.E.: 166 ± 2 days.

Discussion

For the European stock I found the mean duration for unfertilised eggs to be 239 days, and Korboot (l.c.) for Australian stock to be 19 months (ca. 570 days). We can estimate the time for a generation by the following formulae:

$$^{TG}\text{ unfert.} = DN + POP + {}^{DE}\text{ unfert.} \quad (1)$$

where ^{TG} unfert. is the time for one generation from unfertilised eggs; DN is the duration of nymphal life; POP is the pre-oviposition-period; ^{DE} unfert. is the duration of unfertilised eggs. All measurements are in days. If we calculate ^{TG} unfert. for the Australian and European stock (data from Hadlington (l.c.), Korboot (l.c.) and Carlberg (a) for specimens with normal number of nymphal instars) we get:

$$^{TG}\text{ unfert. Aust.} = 104 + 26 + 570 = 700 \text{ days.}$$

and

$$^{TG}\text{ unfert. Europ.} = 179 + 39 + 239 = 457 \text{ days.}$$

For the Australian stock a two-year cyclic development is evident. Hadlington (l.c.) also said that the life cycle could be from one to three years. The European stock which is

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independent of climate (the native stock must be dependent on climate cycles in some way or another) shows the time for a generation of ca. 15 months, which makes no sense.

For the European stock I and Chasse (1975) found a mean duration for fertilised eggs to be 166 days and 5 months (ca. 150 days) respectively, while Korboot (l.c.) for the Australian stock reported 8 months (ca. 240 days). We can estimate the time for one generation by the following formulae:

$$^{TG}\text{fert.} = DN + POP + {}^{DE}\text{fert.} \quad (2)$$

where ^{TG}fert. is the time for one generation from fertilised eggs; ^{DE}fert. is the duration of fertilised eggs; all other symbols as for formulae (1). If we calculate ^{TG}fert. for the Australian and European stock (with data from the same authors as for equation (1)) we get:

$$^{TG}\text{fert. Aust.} = 104 + 19 + 240 = 369 \text{ days.}$$

and

$$^{TG}\text{fert. Europ.} = 179 + 39 + 166 = 384 \text{ days.}$$

Both the European and Australian stock shows an one-year cyclic development. It is rather surprising that the longer nymphal life of the European stok also resulted in an one-year year cyclic development.

Hadlington (l.c.) stated that diurnal fluctuations in the temperatures was effective in breaking the pre-embryonic diapause. But he made the reservation: "but the mechanism is by no means clear and could involve other components of the environment". Bergerard (1967) showed that the photoperiod determinate the duration of the eggs in *Carausius morosus* Sinéty and *Baculum extradentatum* Brunner von Wattenwyl. So the natural components in the environment as the photoperiod and the temperature are important factors which determinate the duration of the eggs.

Summary

The mean duration of 239 days for European unfertilised eggs made a complete generation on ca. 15 month. For the Australian stock a two-year cyclic development occured.

The mean duration of 166 days for European fertilised eggs made a complete generation on ca. one year. Both the Australian and the European stock had an one-year cyclic development, but with different duration of nymphal life. Even with a longer nymphal life as in the European stock a one-year cyclic development occured.

References

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